New Hampshire Climate Change Policy Task Force

Draft Action Reports under Development
New, Revised and Potential Additions

Adaptation (ADP)
Energy Generation and Use (EGU)
Transportation and Land-Use (TLU)
Agriculture Forestry and Waste (AFW)
Residential, Commercial and Industrial (RCI)

Prepared by NHDES
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ADP Action 8 – Develop a Climate Change Adaptation Plan for the State of New Hampshire

Revised November 10, 2008

Summary

The State should develop a Climate Change Action Plan to support public and private partners and state agencies in the planning and preparation for the episodic and chronic events in New Hampshire that are projected to result from climate change. This Plan should identify actions that proactively prepare for these incidents and minimize their impacts on human health, the natural environment and the built environment (e.g., homes, businesses, roads, bridges, dams). The Plan will include the methodologies for making sure all necessary data are available to decision makers. There is a general lack of urgency for planning for adaptation to climate change. This Plan can provide the necessary education and information to keep New Hampshire moving in a proactive manner as we continue to face developing climate change impacts. The Plan will help our state and our decision makers identify and implement additional critical adaptation strategies.

Initial Steps:

Overall Implementation:

- Executive Order to establish the necessary body and define the scope of their responsibilities.
- Assemble the necessary bodies to develop the Adaptation Plan including members from various interests including, but not limited to, environmental, natural resources, public health, municipal and regional governance, built infrastructure (e.g., roads, dams, buildings), academia (UNH) as well as groups gathering data necessary for decision makers (e.g., coastal and flood plain LIDAR data).
- Identify data gaps and explore ways to fill those gaps
- Ensure that the plan is a living document that can change as needed.

Responsible Parties:

- The Governor's Office
- Department of Environmental Services

Timeframe:

- Development of the Adaptation Action Plan can begin immediately.
- Allow 6 months for the Plan's development.
- Once completed implementation can occur in a phased-in approach.

EGU Action 2.6 – Importation of Canadian Hydro and Wind Generation

Revised October 20, 2008 – Comments November 2008 (OCA & PSNH)

Summary

To the extent that it reduces or does not raise electricity rates to the consumer, high voltage transmission lines should be built to import clean power generated from Canadian hydro and wind sources as a complimentary policy to developing non-carbon emitting generation in New Hampshire. Canada is developing vast new hydro and wind generation resources, which are greater than their local needs. This creates an opportunity for New Hampshire and the entire Northeast to obtain clean power. This could provide new power sources to offset future local and regional growth and facilitate retiring or curtailing the operation of~~aging~~ fossil fuel-fired plants in New England, ~~as well as curtail operation of higher cost, carbon emitting generation~~.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): By both developing contracts or commitments for Canadian power companies or brokers and building new high capacity transmission lines, clean power can be purchased and transmitted south from Canada. This concept is not new. In the 1980s, a high voltage transmission line was built from Canada to facilitate lower cost energy purchases and transmission to New England. The new clean power line(s) go beyond the capability of the existing system so that new transmission is needed. ~~However, this example illustrates that the concept has been achieved previously so it can be expanded and/or done again as part of developing relationships and business deals for the product, customers or buyers must also be aligned so the procurement deals can become reality.~~

   The costs of the project, including construction and transmission costs would be ~~born~~ included in the delivery cost of the electricity to the New Hampshire customers. ~~A primary cost approach to this project would be to have customers pay one rate for the energy and transmission of the power and this rate would need to be at or below market prices.~~ In order to support this project, the Task Force should condition its support on any imported~~ant~~ energy being substantially anad verifiably renewable, replacing ~~dirty~~fossil generation, and being competitively priced for ~~ratepayers~~retail electric consumers.

   ~~This same requirement need not apply to potential parallel development of New Hampshire-based renewable generation, as potential increased costs should be considered in the context of the overall project benefits.~~

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order):* PUC orders and positive legislative support to clarify issues as needed. [What about ISO or FERC roles? – MAH]

   b. *Resources Required*: Program developers [Examples of who this would be? – MAH] are needed to find and align sellers and buyers of this clean power. These agreements must be framed around the needed construction of a new high voltage transmission line(s) which would serve as a necessary conduit for power flow. A positive regulatory or legislative signal on this issue is very important.

c. *Barriers to Address*: The barriers that New Hampshire needs to overcome are the state approvals needed to allow such a project to proceed [Any regional or federal approvals needed? – MAH]. This includes PUC and/or legislative approvals to allow construction of a new transmission system. This signal will be the key catalyst to bring deals to closure. **[**Isn't this already allowed? Is PSNH (and other transmission owners) actually looking for incentives? – MAH]

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
   a. *Parties Responsible for Implementation:* PUC and utilities or customers purchasing power from Canadian supplier, FERC and ISO-NE.
   b. Parties Paying for Implementation: ~~Utilities and c~~Customers.
   c. Parties Benefiting from Implementation: All customers, Canadian renewable~~s~~ resource owners~~developers~~, and transmission owners/investors ~~(such as Northeast Utilities and National Grid),~~ who are regulated by the Federal Energy Regulatory Commission under FERC approved transmission rates~~earn FERC approved rate of return on transmission investments~~.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

   a. Existing
      - Regional Greenhouse Gas Initiative (RGGI)
      - Renewable Portfolio Standard (RPS)
   b. *Proposed*:
      - EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

6. Timeframe for Implementation: Soon after 2012, depending on necessary review and approval steps.

7. Anticipated Timeframe of Outcome: Upon installation and successful testing.

Program Evaluation

Value analysis of electric rate change versus environmental benefit must be weighed for each program or project.

1. Estimated CO2 Emission Reduction

   a. (2012): 0 MMTCO2e

   b. (2025): 6.09 MMTCO2e

   c. (2050): 6.09 MMTCO2e

2. Economic Effects – ***Costs and Savings for this Action have not yet been completed.*** **[**This is a critical piece of this action. – MAH]

   a. Costs
      i. (2012):
      ii. (2025):
      iii. (2050):

   b. Savings ($)
      i. (2012):
      ii. (2025):
      iii. (2050):

3. Other Benefits/Impacts
   a. *Environmental*: Importation of renewable energy can reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems, if that energy replaces fossil~~dirty~~ generation in New England. Emission reductions resulting from retiring or reducing the operation of existing fossil~~dirty~~ generation in New England will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water. Additional environmental benefits would be gained in New England~~the state~~ by ~~avo~~avoiding the construction of new fossil generation ~~supply-side resources in the New Hampshire~~. However, there are concerns about the impact of hydro power on methane generation in the reservoirs that are a matter under review by the Canadian governments in their review of new hydro generation in Canada.~~that must be considered in any analysis of the costs and benefits of Canadian resources~~.

   b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, as with all measures that mitigate climate warming by reducing harmful emissions, this action will also be beneficial to the health of human populations and ecosystems in general to the extent that imported renewable energy replaces existing ~~dirty~~fossil ~~carbon-intensive~~ generation in the New England~~state or region~~.

   c. *Social:* Programs that ~~promote environmental sustainability by conserving natural resources and~~ reduc~~eing~~ emissions have immediate and long-term benefits to society. ~~Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.~~

   d. Other:

4. Potential for Implementation (i.e., including challenges, obstacles and opportunities)

   a. *Technical:* The technology exists to do this work. Lead time continues to lengthen due to current high global demand for this equipment.

   b. *Economic:* This recommendation provides short term value in the form of construction jobs during the 3-4 year construction period, provides a smaller number of long-term jobs related to the maintenance and operation of the new transmission facilities, provides

long-term property tax value to the towns in which the facilities are located, and provides additional long-term state revenue tax revenue from the taxed net income on the facilities. ~~of wages for a number of short term jobs along the transmission corridor, and high long-term benefits to transmission owners~~. The ~~costs and/or~~ benefits to electric customers would be determined by the specific terms of any purchased power agreement and the reductions to New England fossil generation which would be subject to state regulatory review and confirmation at the time of any filings for state approval.~~are not known.~~ ~~This measure provides short term value in the form of wages.~~

c. Statutory/Regulatory:

d. *Social:* There may be resistance to allow siting of any new, larger power projects. This will ~~may~~ require significant effort to address concerns and develop the necessary support.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:
   - **ISO-NE Scenario Analysis Report**
     Exploring the economic, reliability, and environmental impacts of various resource outcomes for meeting the region's future electricity needs
     http://www.iso-ne.com/committees/comm_wkgrps/othr/sas/mtrls/elec_report/scenario_analysis_final.pdf

EGU Action 2.7 – Allow Regulated Utilities to Build Renewable Generation

Revised October 20, 2008 – Comments November 2008 (OCA & PSNH)

Summary

To the extent that it increases New Hampshire's overall renewable energy capacity and the rate at which those resources are brought online, the State should provide regulated utilities with the authority to construct and/or acquire renewable generating assets. The only regulated electric utility that ~~this~~ currently owns generation~~action would apply to~~ is Public Service of New Hampshire (PSNH), and under existing law PSNH and other utilities (excluding the New Hampshrie Electric Cooperative and municipal electric utilties which are not subject to the restrictions placed on other utilities in the state) which are only specifically authorized to ~~may only invest~~invest in or own new small-scale distributed generation under a new 2008 law. As noted in the ~~legislative history~~summary below, this issue has been an area of intense debate within the L~~l~~egislature and a wide range of opinions exist among the various stakeholder groups across the state. However, in the interest of reducing the State's greenhouse gas (GHG) emissions and reducing vulnerability to global energy price volatility, New Hampshire's energy planning efforts should consider ~~(take advantage of)~~ the significant resources and experiences that ~~Public Service of New Hampshire~~utilities can provide in the development of new renewable generation, in conjunction with a strategy of aggressively encoruagin new low-carbon generation sources so that ultimately less fossil fuel generation plants are needed in New England.~~retiring the dirtiest and most carbon-intensive generating plants~~. The key element to achieve the GHG reductions is to draft ~~provide clarifying~~ legislation that gives PSNH the authority to construct and/or acquire renewable generating assets, ~~coupled with commitments to retire the dirtiest sources~~.

Program Description

Summary of Electric Generation Restructuring[1]

Revised Annotated Statutes (RSA) 374-F set forth the policy and implementation steps for restructuring New Hampshire's electric utility industry to a competitive market. ~~Subsequent~~ As a result of the~~to~~ enactment of RSA 374-F in 1996, the PUC ordered the electric utilities to divest their ownership interests in generation assets in order to eliminate any vertical market power. Electric utilities were to become primarily transmission and distribution companies. After protracted court battles between the utilities and the state on various issues related to restructuring, divestiture ~~was agreed to~~proceeded, most notably in the negotiated PSNH Settlement Agreement as approved by the PUC in 2000. The Legislature, through passage of SB 472 in 2000, played a key role in enabling and setting forth important terms of the Settlement Agreement. In it, the Legislature directed that PSNH fossil generation assets be sold by July 1, 2001, "unless the PUC finds due to circumstances beyond its control that further delay is in the public interest."

However, ~~I~~in 2001, House Bill 489 was passed in reaction to the electric restructuring debacle that occurred in California during the prior summer and the increases in wholesale prices for electricity in New England. The 2001 legislation specified that PSNH's fossil and hydro assets could not be ~~sold~~divested ~~off~~ any sooner than February 1, 2004, but that the PUC should expeditiously initiate and complete the sale of Seabrook to benefit customers' stranded cost recovery obligations. In addition, the legislation extended the availability of transition service for residential, commercial and industrial

[1] This summary was based on a draft document, entitled "Legislative Policy on the Generation of Electricity", that was presented by Joel Anderson, House Committee Research Office, to the State Energy Policy Commission on October 25, 2006.

customers. In essence, the Legislature put a temporary brake on full divestiture of generation assets and created a safety net for electric consumers.

In 2003 the Legislature passed Senate Bill 170 (RSA 369-B:3-a) which specified that "the sale of PSNH fossil and hydro generation assets shall not take place before April 30, 2006. …..subsequent to April 30, 2006, PSNH may divest its generation assets if the commission finds that it is in the economic interest of retail customers of PSNH to do so, and provides for the cost recovery of such divestiture."

Senate Bill 170 provided that "prior to any divestiture of its generation assets, PSNH may modify or retire such generation assets if the commission finds that it is in the public interest of retail customers of PSNH to do so, and provides for the cost recovery of such modification or retirement." In large part, this statutory language was added to allow PSNH to convert one of its coal boilers at Schiller to a wood-burning ~~one~~unit.

It seems to be generally accepted that electric utilities can not currently ~~longer~~ build ~~any~~ new power plants of any significant size. Recent attempts have been made in the Legislature, ~~(~~which have failed~~)~~, to enable utilities to do so ~~once~~ again. These attempts have triggered the policy debate on whether changes in the market, new supply needs, or other perceived public needs such as constructing a new wood-fired plant in the North Country, are best met by the private sector and competitive markets or by public utilities and regulated rates. This debate has not been resolved by the Legislature.

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Society needs to move away from carbon-based supply-side resources and transition towards generating facilities that are low- or non-CO_2-emitting. Although significant and increasing resources will be deployed to reduce electrical demand through greater energy efficiency, clean distributed generation and efficient co-generation projects, ~~the~~ some of the current ~~level of~~ generating resources will be needed to bridge the transition from today's balance of supply and demand to a low-carbon emissions future. As efforts continue in improving efficiency and reducing demand, the overall strategic plan must also anticipate load growth. An additional, and reasonable, assumption is that certain fossil fuels will ~~reduce~~ be less~~in~~ ~~availabil~~available and more expensive~~ity~~ in~~to~~ the future ~~based on limited supply or cost.~~ . As this occurs, energy prices ~~will~~ are likely to increase proportionately.

An important component of a ~~core~~ strategy to manage future energy costs is to diversify the supply mix and have less carbon-based supply facilities. This is accomplished by building low and non-carbon emitting generating facilities over the next five to ~~ten~~fifty years, and, importantly, by retiring older, dirtier and more carbon-intensive fossil fuel plants in New England. These investments will assist in stabilizing rates into the future and be sound investments to meet increasing demands for carbon-free energy. These investments ~~will~~ can also provide high value to the New Hampshire economy by material procurement and wages for local craftsmen. This, in turn, ~~becomes a positive approach which~~ benefits local town(s) and the state economy. Finally, the hope is that these plants will reduce future energy costs with savings returned to the customers.

~~New Hampshire's planning efforts should not overlook the significant resource~~ Public Service of New Hampshire has a strong desire to ~~can provide in the~~ develop~~ment of~~ new renewable generation. However, ~~I~~in order to allow PSNH to do so,~~utilize its experience and resources, barriers must be removed to allow low- and non-emitting generation technology to be built including clarifying~~ the current NH law ~~which~~ that ~~prevents~~addresses ~~r~~does not specifically address new regulated generation~~'s authority to construct or acquire generation must~~should be changed. ~~Regulated utilities should have the authority to provide their~~

~~customers additional, new renewable generation while at the same time broadening the potential builders of renewable generation.~~

~~There is a critical~~~~PSNH~~Many proposes that we should ~~need to~~ address additional generation requirements with a portfolio of utility—owned renewable generation in addition to market provided renewable generation, which such new state regulated generation being~~as~~ at least one 50 MW biomass plant, up to three 20-25 MW distributed generation units to help meet peak load requirements, up to 12 MW of photovoltaic (solar) cells, and up to six 24 MW wind projects. ~~PSNH asserts that t~~These~~These~~ efforts in addition to merchant developed renewable generation, would complement increasing energy efficiency and demand-side programs while providing a balanced generation portfolio and keeping customers' best interests in mind. However, even with this amount of merchant and state regulated renewable generation, New England is expected to still fall short of its goals and even more renvewable generation is desireable.~~This approach adds more local, New Hampshire renewable generation, while supporting the regional effort to develop more renewable generation.~~ It is also important to acknowledge that ~~Again,~~ while addressing supply needs, ~~it is imperative that~~the electrical transmission capability within the state must be enhanced and increased to support the development of new low- or non- CO_2-emitting generation.

It is also important that any policy to build new utility-owned renewable generation must be combined with aggressive efforts to reduce demand for electricity through energy efficiency and demand response, as well as retiring the unneeded~~dirtiest and most carbon intensive~~ fossil fuel-fired generating plants in New England. This is critical to achieve our CO_2 reduction goals.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order)*

      i. Seek legislation to ~~clarify~~ change existing law to allow~~a~~ regulated utilities ~~authority~~ to construct and or acquire renewable generation.

      ii. Establish streamlined state and local permitting processes. Consider an expedited process for smaller generation facilities using renewable resources.

      iii. Provide for expedited PUC proceeding schedules ~~when~~ so that review processes may be held prior to commencement of a project and construction.

      ~~Develop comprehensive plans to retire the dirtiest and highest CO_2 emitting plants in the state.~~

   b. *Resources Required*: NH Legislature, state government, PUC, NHDES, and local governing bodies must align support of both legislation and specific proposals~~such applications~~.

   c. *Barriers to Address*: Eliminate legal barriers for regulated utilities to construct new, clean generation.

      i. Establish clear legislation authorizing regulated utilities to construct or acquire renewable generation.

ii. Address obstacles to speedy and efficient project review at the state and local levels.

iii. Address transmission infrastructure limitations, including the Coos County loop in northern New Hampshire.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.):

   a. *Parties Responsible for Implementation:* State legislature, NHDES, PUC, New Hampshire Site Evaluation Committee, and regulated utilities.

   b. *Parties Paying for Implementation:* Customers of the regulated utility would pay the cost to construct new generation facilities. ~~Customers in New Hampshire and potentially throughout New England would pay for enhanced transmission;~~

   c. *Parties Benefiting from Implementation:* Customers of the utility would benefit from ~~associated~~ anticipated cost savings (e.g. lower compliance costs, avoidance of higher cost market purchases, etc.) that would be reviewed during a PUC proceeding. All citizens would benefit from reduced CO2 emissions. Investors in ~~U~~utilities building and owning generation will also benefit through the state regulated rates of return they earn on such new plants, which would be included as one of the overall costs of the facilities serving customers which would be included in customers' electric rates for those customers who do not otherwise choose an electric supplier.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

   a. Enable the development of transmission resources in northern New Hampshire to facilitate renewable power transfers to southern New Hampshire. Also, transmission facilities should be installed to allow clean energy purchases. (See Senate Bill 383.)

   b. ~~Allow t~~The deployment and installation of clean small scale distributed energy and heat producing generating facilities is now allowed. (See Senate Bill 451.)

   c. Evaluate the retention of existing nuclear power generation facilities into the future. This form of generation is considered in detail as a separate item (see EGU Action 2.5 – Nuclear Power Capacity).

   ~~Evaluation of retiring dirtiest fossil-fuel fired plants. [Note: is this being done by UNH?]~~

6. Timeframe for Implementation: Begin in 2008 by passing appropriate legislation to ~~clarify~~ allow regulated ~~generation's~~ utilities~~authority~~ to build new generation.

7. Anticipated Timeframe of Outcome: Pass enabling legislation in 2009. Provide incentives for ~~Incent~~ the construction of facilities to be on-line in support of New Hampshire's stated goal of a 25-percent reduction in carbon emissions by 2025 thus encouraging the development of -.

[Something is missing here. – MAH]

a. 50 MW by 2012 - biomass
b. 200 MW by 2025 – biomass, wind, and other
c. 400 MW by 2050 – biomass, wind and other

Program Evaluation

Value analysis of electric rate change versus environmental benefit must be weighed for each program or project.

1. Estimated CO2 Emission Reduction –
   a. (2012): 0.14 MMTCO2e [How were these reductions estimated? – MAH]
   b. (2025): 0.56 MMTCO2e
   c. (2050): 1.12 MMTCO2e

2. Economic Effects – ***Costs and Savings for this Action have not yet been completed.*** [This is important but I'm not sure how it we do it. – MAH]

A reasonable assumption is that certain carbon based fuels will ~~reduce~~ be less ~~in availabil~~available and more expensive~~ity~~ in~~to~~ the future ~~based on limited supply or cost~~. As this occurs, energy prices will increase proportionately. An important component of a core strategy to manage future energy costs is to diversify the supply mix and have less carbon-based supply facilities. This is accomplished by building low and non-carbon emitting generating facilities over the next five to ~~ten~~fifty years, therby causing fossil based generation to be reduced .~~combined with retiring dirty fossil fuel fired plants.~~ These investments ~~will~~ can assist in stabilizing rates into the future and be sound investments to meet increasing demands for carbon-free energy. These investments will also provide high value to the New Hampshire economy by material procurement and wages for local craftsmen. This, in turn, ~~becomes a positive approach which~~ benefits local town(s) and state economy. Finally, the hope is that these plants will reduce future energy costs, with savings ~~returned~~ realized by~~to the~~ customers in electric rates.

   a. Costs
      i. (2012):
      ii. (2025):
      iii. (2050):
   b. Savings ($)
      i. (2012):
      ii. (2025):
      iii. (2050):

3. Other Benefits/Impacts
   a. *Environmental:* The proposed action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems if ~~dirtier~~ fossil-fuel fired plants are ~~-~~operated less or retired as a result of~~in conjunction with~~ building new cleaner generation. Emission reductions resulting from retirements or reduced need to operate fossil fueled generation in New England will

directly improve air and water quality while indirectly benefiting the fish, wildlife, and ecosystems that depend on clean air and water.

b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions through retiring or reducing the need to operate foosil fueld ~~the dirtiest plants~~generating unit in New England will also be beneficial to the health of human populations and ecosystems in general.

c. *Social:* Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving ~~energy conservation and some~~ alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.

d. *Other:* ~~Energy efficiency and~~ ~~e~~Emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
   a. *Technical:* Pending plans to construct facilities can be implemented relatively easily once siting and transmission policy issues are addressed.

   b. *Economic:* New facilities will create many construction jobs, long-term employment and tax revenue which will have a positive impact on the state's economy and will avoid fuel expenses being paid to other states and countries. The rate impacts of any new plants should be reviewed by the PUC prior to construction.

   c. *Statutory/Regulatory:* The Legislature should~~must~~ change existing laws.~~and Commission has the authority to approve most needed changes. If NH attempts to socialize the costs of transmission improvements across New England, the ISO and/or FERC will need to be involved.~~

   d. *Social:* ~~Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.~~

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

EGU Action 2.8 – Identify and Deploy the Next Generation of Electric Grid Technologies
Revised October 20, 2008

Summary

In order to increase the efficiency of the grid and expand the integration of renewable distributed power generation to reduce total greenhouse gas emissions from the electric generation, the state of NH should work at the state and Regional level to facilitate the adoption of the next generation of electric grid standards, technologies, and practices through a *phased-in approach*. This transition will include the modernization of the electricity transmission and distribution system to incorporate digital information and controls technology, deployment of energy storage devices, and sharing of real-time pricing information with electricity customers and "smart" technologies in homes and businesses. Deployment of the technology and adoption of standards would occur in a step-wise fashion in which initial investments would first exploit the current most cost-effective technologies while more advanced technologies would be employed as they become more cost-effective. This transition would occur across New Hampshire and the entire ISO-NE grid to the point of general adoption and ongoing market support in the electric sector. Such action would lead to the creation of a self-monitoring, adaptive system capable of semi-automated restoration and higher energy efficiency through reduced line losses and better integration of renewable resources through energy storage capacity and the deployment of end use technologies that are able to shift electric use to times when renewable generation is greatest.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The state of NH should work at the state and Regional level to facilitate the adoption of Smart Grid standards, technologies, and practices across New Hampshire and ISO-NE electricity grid to the modernize the electricity transmission and distribution system by:
   - Conducting programs to deploy advanced techniques for measuring peak load reductions and energy efficiency savings on customer premises from smart metering, demand response, distributed generation and electricity storage systems;
   - Establishing demonstration projects specifically focused on advanced technologies for power grid sensing, communications, analysis, and power flow control, including the integration of demand-side resources into grid management;
   - Requiring electric utilities, before undertaking investments in non-advanced grid technologies, to demonstrate that alternative investments in advanced grid technologies have been considered.
   - Requiring electric utility rates to: (1) align utility incentives with the delivery of cost-effective energy efficiency; and (2) promote energy efficiency investments;
   - Requiring all electricity purchasers to be provided direct access by their electricity provider to daily information regarding prices, usage, intervals and projections, and sources;
   - Requiring state regulatory authorities and non-regulated utilities to reconsider specified standards to take into account Smart Grid technologies;
   - Encouraging deployment and integration of renewable energy resources, both to the grid and on the customer side of the electric meter;
   - Deploying and integrating of advanced electricity storage and peak-sharing technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning; and
   - Providing consumers with new types of information and control options.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

a. *Method of Establishment (e.g., legislation, executive order):* Assess the state of current Smart Grid technology market penetration and the identification of state, regional and national regulatory and institutional opportunities and obstacles related to Smart Grid development and identify the necessary legislation, PUC orders and incentives required to initiate development.
b. *Resources Required:* Appropriate legislation and rules, government investment, and utility incentives and investment recovery mechanisms. Funding for initial development and expansion could come from the GHG Emissions Reduction Fund, funded by RGGI allowance auctions and administered by the NH PUC.
c. *Barriers to Address (especially for medium-to-low feasibility actions)*: Expansion and replacement of transmission and distribution system can be extremely expensive.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)
   a. *Parties Responsible for Implementation*: Legislature; PUC; OEP; DES; Energy Efficiency and Sustainable Energy Board; and utilities.
   b. *Parties Paying for Implementation*: Utilities and consumers.
   c. *Parties Benefiting from Implementation*: All consumers.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
   a. *Existing*:
      - Regional Greenhouse Gas Initiative (RGGI)
      - Renewable Portfolio Standard (RPS)
   b. *Proposed*:
      - EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

6. Timeframe for Implementation: The technology required already exists and could be deployed within a year.

7. Anticipated Timeframe of Outcome: Time to total upgrade of the existing grid and expand into new areas in order to take advantage of renewable distributed generation could exceed a decade.

Program Evaluation

1. Estimated CO_2 Emission Reductions: The GHG reductions that result from this action would be realized through other initiatives. The Smart Grid supports RGGI and the RPS

2. Economic Effects – Not yet determined.
   a. Costs
      i. (2012):
      ii. (2025):
      iii. (2050):

   b. Savings ($)
      i. (2012):
      ii. (2025):
      iii. (2050):

3. Other Benefits/Impacts
    a. *Environmental:* Improvements in energy efficiency and expansion of renewables will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.
    b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social:* Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other:* A Smart Grid is anticipated to reduce power outages and to localize their effect resulting in a reduction in economic impact and social disruption.

4. Potential for Implementation (*i.e., including challenges, obstacles, and opportunities*)
    a. *Technical*: Smart Grid technology already exists and can be installed immediately.
    b. *Economic*: Costs may be an issue for individual elements of a "smart grid" and will need to be phased in when economies of scale become applicable and the technologies become cost effective.
    c. *Statutory/Regulatory*: Legislation, PUC orders and revised regulations may need to be provided in order for advanced grid technologies to be deployed or deployed rapidly.
    d. *Social*:

5. Other Factors of Note: A Smart Grid has frequently been observed to be key to leveraging electric plug-in hybrid technology in order to reduce GHG emissions from the transp0ortation sector without causing a spike in peak load in the electric sector that would offset some or all of the transportation reductions depending on the energy source (e.g., coal vs. natural gas vs. renewables). With the development of a smart Grid, plug-in hybrids could be plugged into the grid and be programmed to charge when demand is lowest or when intermittent renewable generation such as wind is available.

6. Level of Group Interest: Developed at the request of the Climate Change Policy Task Force

7. References:
    a. House Committee on Energy and Commerce http://energycommerce.house.gov/energy_110/index.shtml
    b. House Committee on Energy and Commerce – Committee Print - Transition to a Smart Grid http://energycommerce.house.gov/cmte_mtgs/FC062707MU/ENBILL07_042_xml.pdf
    c. House Committee on Energy and Commerce – Committee Print - Plug-in Hybrid Promotion http://energycommerce.house.gov/cmte_mtgs/FC062707MU/ENBILL07_045_xml.pdf
    d. Google's 'Smart Grid' idea? Get the govt to pay for it

http://www.theregister.co.uk/2008/09/19/google_ge_smart_grid_ploy/

e. H.R. 3237, The Smart Grid Facilitation Act of 2007
http://www.washingtonwatch.com/bills/show/110_HR_3237.html

f. Smart Grid Consortium to Develop Smart Grid City
http://www.greencarcongress.com/2008/01/smart-grid-cons.html

EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

Revised October 20, 2008

Summary

The State should encourage the development of customer-sited low- and non-CO_2-emitting distributed generation (DG) through a combination of regulatory changes and incentives. These distributed generation resources can include renewables such as solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, and systems fueled with biomass, as well as extremely efficient fossil fuel fired cogeneration or combined heat and power (CHP). The distributed electricity generating systems provide electricity system benefits such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fueled generation and thus reducing greenhouse gas emissions. Policies to encourage and accelerate the implementation of customer-sited renewable distributed generation include direct incentives for system purchase, market incentives—including "net metering", education, state goals or directives, and favorable rules for interconnecting renewable generation systems with the electricity grid.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
Distributed generation sited at residences and commercial and industrial facilities, and powered by low- and non-CO_2-emitting energy sources, provides electricity system benefits and displaces fossil-fueled generation, and therefore reducing greenhouse gas emissions.

Distributed generation networks allow for relatively large numbers of electric generation sites to be deployed on the grid. DG is therefore much less susceptible to large-scale power outages caused by natural or the increasing number of manmade disasters that threaten national security. It reduces the amount of energy lost in transmitting electricity because the electricity is generated very near where it is used, perhaps even in the same building. This also reduces the size and number of power lines that must be constructed. Diesel engines have long been used as distributed power sources to provide emergency back-up power to industry and emergency services. However, even newer DG units have GHG emissions that are significantly higher than power plants that burn cleaner fuels or have emission controls. Although there are state regulations (e.g., NH Code of Administrative Rules Chapter Env-A 3700 NOx Emissions Reduction Fund for NOx-Emitting Generation Sources[2]) that encourage installation of emission controls on diesel engines, these controls do not address GHG emissions.

The use of alternative technologies need to be encouraged as a method for meeting demand for distributed power and can include solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, cogeneration or combined heat and power (CHP) and systems fueled with biomass. Increasing the use of renewable distributed generation in New Hampshire can be achieved through a combination of regulatory changes and incentives including:

- Training and education programs and certification for building planners, builders/contractors, energy managers and operators, renewable energy contractors, and state and local officials on the incorporation of distributed renewable generation and solar space/water heat in building projects;

[2] Administrative Rules can be found at the NH Department of Environmental Services Website, see http://www.des.state.nh.us/.

- Assistance in siting, designing, planning renewable systems;
- Funding mechanisms and incentives could include low-interest loans, rebates on capital costs, tax incentives, and attractive rates for power purchases/net metering;
- The development of interconnection standards to facilitate DG installation;
- Net metering for some renewable distributed generation, and possibly avoided-cost pricing rules for others;
- Net metering standards for highly efficient fossil fuel-fired cogeneration systems
- Pilots and demos, such as renewable systems in government buildings; and
- Research to identify the distributed renewable generation systems most suited to New Hampshire or its regions.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
   a. *Method of Establishment (e.g., legislation, executive order):* Assess the utilization of low CO_2e-emitting and renewable distributed generation in the state and the identification of regulatory and institutional opportunities and obstacles related to expansion of this network and identify the necessary legislation, PUC orders and incentives required to initiate development.
   b. *Resources Required:* Appropriate legislation and rules, funding and incentives. Funding could come from the Renewable Energy Fund, funded by Alternative Compliance Payments, and the Greenhouse Gas Emissions Reduction Fund, funded by RGGI allowance auctions. Both funds are administered by the NH PUC.
   c. *Barriers to Address (especially for medium-to-low feasibility actions):* Existing Net-Metering rules in New Hampshire may preclude the integration of facilities that elect to install co-generation technology if the primary fuel is a fossil fuel. Other barriers may include: commercialization barriers; price distortions; failure of the market to value the public benefits of renewables; failure of the market to value the social cost of fossil fuel technologies; and market barriers such as inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, and "split incentives" between building owners and tenants.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)
   a. *Parties Responsible for Implementation*: Legislature; PUC; OEP; DES; Energy Efficiency and Sustainable Energy Board; and utilities.
   b. *Parties Paying for Implementation*: Utilities and consumers.
   c. *Parties Benefiting from Implementation*: All consumers.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
   a. *Existing*:
      - EGU Action 2.1 - The Renewable Portfolio Standard
      - EGU Action 2.4 - The Regional Greenhouse Gas Initiative
      - NH Senate Bill 451
   b. *Proposed*:
      - EGU Action 2.8 – Identify and Deploy the Next Generation of Electric Grid Technologies

6. Timeframe for Implementation: The technology required already exists and is being implemented. An expanded rate of implementation could occur as soon as the necessary incentives and regulations are put in place.

7. Anticipated Timeframe of Outcome: The time required to fully take advantage of the existing and future opportunities may depend on the construction of a Smart Grid which will better integrate renewable energy generation through energy storage and smart technologies and real-time pricing communication.

Program Evaluation

1. Estimated CO_2 Emission Reductions: The GHG reductions that result from this action would be realized through other initiatives. The promotion of low CO_2e-emitting and renewable distributed generation supports RGGI and possible RECs[3].

2. Economic Effects
    a. Costs
        i. Implementation Cost:
        ii. Timing:
        iii. Impacts:

    b. Savings:

3. Other Benefits/Impacts
    a. *Environmental:* Improvements in energy efficiency will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water. Expanded distrubuted generation could result in a reduction in water consumption at central-station power plant for cooling.
    b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social:* Increased flexibility of electricity supply for consumers hosting generation. Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other:* Utility economic benefits also include loss reduction, reduced capital and operating costs, expanded generation capacity, distribution and transmission capacity investment deferral, reducing risk from uncertain fuel prices, green pricing benefits, etc.[C1] With the appropriate policies in place renewable DG also offers a new income

[3] Individuals at the Public Listening Sessions in September 2008 wondered whether several small-scale renewable generators could combine their generation to qualify for RECs under the existing RPS.

stream. Electricity (grid) system benefits also include reduced peak demand, improved utilization and performance of the electricity system.

4. Potential for Implementation (*i.e., including challenges, obstacles, and opportunities*)
    a. *Technical*:
    b. *Economic*:
    c. *Statutory/Regulatory*:
    d. *Social*:

5. Other Factors of Note: Revenue decoupling must be combined with incentives for utilities to place greater emphasis on energy efficiency activities if the full benefits of decoupling are to be realized. California has had revenue decoupling in place for most of the past 25 years. There, the decoupling mechanism is generally accepted as a way to make the state's electric utilities indifferent to sales levels. Decoupling has had only small impacts on rate volatility. Analyzing ten years' worth of decoupling data, a 1994 U.C. Berkeley study concluded that "decoupling has had a negligible effect on rate levels and has, for [one of the three utilities analyzed], actually reduced rate volatility."[4]

6. Level of Group Interest: Developed at the request of the Climate Change Policy Task Force.

7. References:
    - *NH Senate Bill 451*
      AN ACT authorizing rate recovery for electric public utilities investments in distributed energy resources.
      http://www.gencourt.state.nh.us/legislation/2008/SB0451.html

[4] Joseph Eto, Steven Soft, and Timothy Belden, *The Theory and Practice of Decoupling*, Lawrence Berkeley Laboratory, University of California, January 1994, Report LBL-34555, UC-350 at 46. The cited excerpt of this report is attached hereto as Ex. A. The full report has been filed electronically, and is on file with ENE and available upon request.

EGU Action 2.4 – Promote Low- and Non-CO_2-Emitting Generation

Revised November 17, 2008

Summary

The State of New Hampshire should work at the state and Regional level to facilitate the development of low- or non-CO_2-emitting generation to complement aggressive energy efficiency efforts in order to move away from carbon-based supply-side resources (i.e., fossil-fuel-fired power plants). This power can be provided by clean demand-side (distributed) generation as well as new in-state, regional, and Canadian clean supply-side resources, and enabled through a combination of infrastructure improvements as well as regulatory and policy changes. The development of these resources should be prioritized as follows:

- Energy Efficiency – in-state
- Energy Efficiency – out-of-state
- Renewable Energy – in-state
- Renewable Energy – out-of-state
- Low-Emitting Energy – in-state
- Low-Emitting Energy – out-of-state

The infrastructure improvements should include investments to increase transmission capacity in order to allow renewable generation resources to be built by enabling the power they generate to be distributed to end users. The adoption of the next generation of electric grid standards, technologies, and practices through a *phased-in-approach* may also be required to enable greater energy efficiency in addition to greater utilization of renewable distributed generation. Related to achieving this goal of expanded clean generation is the identification and removal of any existing obstacles to energy facility and transmission infrastructure siting, construction and grid integration (e.g., net-metering and interconnection) within the state, New England and Canada.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Although significant and increasing resources will be deployed to reduce electrical demand through greater energy efficiency, existing supply-side resources will be needed as New Hampshire makes the transition to a low-carbon future. The overall strategic plan must also address anticipated load growth by enabling the construction of clean, new generating facilities, more rapid expansion of clean, renewable demand-side (distributed) generation, and the transmission of clean power from those areas where supply exceeds demand.

   There is a critical need to meet demand and replace older more carbon-intensive facilities with a range of newly constructed central-station plants that are large (200 + MW), medium (50-200 MW) and small (less than 50 MW) generating facilities. Furthermore, it is reasonable to assume that certain carbon-based fuels will become less readily available in the future and that energy prices will increase. An important component of a core strategy to manage future energy supply and cost structure is diversification of the supply mix. Building low- and non-carbon emitting demand- and supply-side generating facilities over the next 5 to 10 years would help New Hampshire meet the inevitable and growing demand for carbon-free energy and would assist in stabilizing and containing future energy prices. The primary technologies under consideration are cogeneration (combined heat & power), hydro, solar photovoltaic, wind, geothermal, tidal and biomass.

   While addressing supply needs, electrical transmission capability within the state should also be enhanced and increased to ensure that new supply can reach load, largely in southern New England.

This could support the development of new low- or non- CO_2-emitting generation facilities in New Hampshire, as well as allow the importation of Canadian hydro and wind power if it proves to be cost effective and lead to lower or unchanged electric rates. Consequently, the state should evaluate existing barriers to both facility siting and electrical transmission and develop solutions to overcome any obstacles or deficiencies in the shortest possible time frame. Workable solutions would involve coordinated planning with neighboring states and Canada.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order)*
        i. Seek methods to influence ISO-NE to expedite interconnection application review and approval for low- or non- CO_2-emitting generation facilities.
        ii. Evaluate permitting processes to determine if state and local, including the SEC, processes can be streamlined. Consider an expedited process for smaller generation facilities using renewable resources.
        iii. Develop tax incentives to incent the installation of low and non-CO_2 emitting distributed generation.
        iv. The legislature should consider whether additional issues need to be resolved in order to encourage the construction of low and non-CO_2 emitting new generating capacity.
    b. *Resources Required*: ISO-NE, state government, PUC, NHDES, and local governing bodies must align support of such applications. Appropriate legislation and rules, government and ratepayer investment, and utility incentives and investment recovery mechanisms would also be needed.
    c. *Barriers to Address*: Eliminate barriers for construction of new, clean generation.
        i. Address transmission infrastructure limitations, including the Coos County loop in northern New Hampshire
        ii. Address obstacles to speedy and efficient project review at the state and local levels.
        iii. Create financing mechanisms that build needed transmission and ensure benefits for consumers from new generation.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)
    a. *Parties Responsible for Implementation*: State legislature, NHDES, PUC, New Hampshire Site Evaluation Committee, Energy Efficiency and Sustainable Energy Board and regulated utilities.
    b. *Parties Paying for Implementation*: Ratepayers in New Hampshire and potentially throughout New England would pay for enhanced transmission; company shareholders would pay for costs to construct new generation facilities.
    c. *Parties Benefiting from Implementation*: All citizens would benefit from reduced CO_2 emissions.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)

a. Encourage expanded sourcing of electrical supply contracts from low- or non-CO_2-emitting generating facilities to displace current CO_2-emitting resources and to meet new demand. Specifically, policies should be put in place to increase supplies from carbon-free sources (see EGU Action 2.4 – Low- and Non-CO_2-Emitting Supply-Side Resources).

b. Enable the development of transmission resources in northern New Hampshire to facilitate renewable power transfers to southern New Hampshire. Also, transmission facilities should be installed to allow clean energy purchases. (See Senate Bill 383.)

c. Allow the deployment and installation of clean, small-scale distributed energy and heat producing generating facilities. (See Senate Bill 451, RSA 374-G.)

d. Evaluate the retention of existing nuclear power generation facilities into the future. This form of generation is considered in detail as a separate item (see EGU Action 2.5 – Nuclear Power Capacity).

6. Timeframe for Implementation: Begin in 2008 by passing appropriate legislation to provide an expedited facility siting review/approval process and to address existing electrical transmission limitations in New Hampshire.

7. Anticipated Timeframe of Outcome: Complete development of an expedited facility siting process and resolve existing transmission issues in 2009. Consider pending plans to construct facilities to meet on-line availability dates in the period from 2014 to 2020. These actions will be necessary if New Hampshire is to achieve the goal of a 25-percent reduction in carbon emissions by 2025.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions: This action is not individually quantified for potential emission reductions. Significant reductions could be achieved by:
   - Importing more power from Canada
   - Importing more power from Maine (1,000 MW new wind energy is planned)

2. Economic Effects

   Note: Value analysis of electric rate change versus environmental benefit must be weighed for each program or project considered.

   a. Costs

      i. Implementation Cost: Low
      ii. Timing: Constant / even
      iii. Impacts: State government (due to administrative costs)

   b. Savings: Not directly quantifiable; proposed action is a supporting mechanism.

3. Other Benefits/Impacts:

   a. *Environmental*: The proposed action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our

ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.

b. *Health*: Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.

c. *Social*: Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.

d. *Other*: Energy efficiency and emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

   a. *Technical*: Pending plans to construct facilities can be implemented relatively easily once siting and transmission policy issues are addressed.

   b. *Economic*: New facilities will create many construction jobs, long-term employment and tax revenue which will have a positive impact on the state's economy and will avoid fuel expenses being paid to other states and countries.

   c. *Statutory/Regulatory*: The Legislature and Commission has the authority to approve most needed changes. If NH attempts to socialize the costs of transmission improvements across New England, the ISO and/or FERC will need to be involved.

   d. *Social*: Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

EGU Action 1.1 – Consider Alternative Rate Design

Revised November 17, 2008

Summary

To the extent that it reduces or does not raise electricity and manages the risk to the utilities, The Public Utilities Commission (PUC) should identify and implement appropriate alternative rate designs for utilities in order to remove obstacles to increasing energy efficiency. Existing rate structures may conflict with the State's energy efficiency and alternative energy goals, in that traditional rate design is based upon "throughput" incentives for utilities to sell more energy (e.g., kW, kWh, therms) in order to increase their annual profits. Advocates of alternative rate structures believe that these mechanisms are a necessary ingredient to obtain strong utility support for energy efficiency and would complement other demand side management programs. Consumer advocates have raised issues regarding rate impacts and the potential for customers unfairly bearing all risks related to providing electricity. New Hampshire should explore these issues and develop a fair approach to new rate mechanisms that protect consumers and provide appropriate incentives to utilities to promote energy efficiency.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
Traditional regulatory methods provide strong disincentives for energy efficiency and types of customer-sited resources reduction, as utility revenues and profits are linked to unit sales (e.g., kW, kWh, therms). The loss of sales due to successful implementation of customer-sited resources (e.g., energy efficiency, distributed generation/combined heat & power, demand reduction) will therefore lower utility profitability[5]. Utility spending on energy efficiency programs can affect a utility's financial position in two additional ways: (1) through recovery of the direct costs of the programs; and (2) through the effects on shareholder value of energy efficiency spending versus investment in supply-side resources[6].

The "throughput" incentive is at odds with public policy aimed at reducing the total greenhouse gases emissions by inhibiting a company from supporting investment in and use of least cost energy resources, and encourages utilities to promote incremental sales, even when they are wasteful and more expensive than demand-side resources. To address this issue, ratemaking policy should better allow utilities to align their profit motives with the policy goal of reducing emissions through the most cost effective means, whether energy efficiency or low and non-CO_2 emitting generation[7]. A variety of mechanisms have been developed to better facilitate the achievement of this goal by aligning rate making and such policy goals including:

- Decoupling (full, partial, limited);
- Shareholder Performance Incentives[8];
- Performance Target Incentives;
- Cost Capitalization Incentives;

[5] Weston, Frederick (2008) Customer-Sited Resources and Utility Profits: Aligning Incentives with Public Policy Goals US EPA Webinar (28 August 2008) http://www.epa.gov/CHP/documents/wbnr082808_weston.pdf
[6] National Action Plan for Energy Efficiency (2007). Aligning Utility Incentives with Investment in Energy Efficiency. Prepared by Val R. Jensen, ICF International. www.epa.gov/eeactionplan.
[7] Weston, Frederick (2008) Customer-Sited Resources and Utility Profits: Aligning Incentives with Public Policy Goals US EPA Webinar (28 August 2008) http://www.epa.gov/CHP/documents/wbnr082808_weston.pdf
[8] Today the New Hampshire electric utilities earn a Shareholder Incentive for the delivery of the "Core" ratepayer-funded energy efficiency programs, in a range of 8% to 12% of the overall annual program budget.

- Shared Net Benefits Incentives; and
- "Save-a-Watt" Incentives.

These mechanisms target the key financial barriers to utility support for customer-sited resources while stabilizing utility revenues, and can reduce or eliminate a host of risks for utilities. Customer protections must be included to ensure that all risks are not shifted to customers.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order):* The PUC can implement decoupling either as a general policy, or on a utility-specific basis. There is currently an open docket investigating decoupling an other rate mechanisms (DE 07-065). If the PUC implements decoupling, there would likely be proceedings to review the mechanism and to make any necessary reconciliation every few years.
    b. *Resources Required:* Staff time and analysis to evaluate the impact that individual mechanisms will have on emissions, implementation of additional energy efficiency programs, and customer rates.
    c. *Barriers to Address (especially for medium-to-low feasibility actions):* There is a recognition that some mechanisms alone do not provide a positive incentive for new energy efficiency programs by itself. It has been suggested that some mechanisms, such as decoupling, shift some risk from utility shareholders to customers and would therefore justify lower rates of return for utilities. Conversely, in the absence of either a multi-year rate plan or the use of a future period for rate setting purposes, it could increase risk for a utility.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)
    a. *Parties Responsible for Implementation*: Public Utilities Commission, regulated electric and natural gas utilities.
    b. *Parties Paying for Implementation*: Customers would experience additional charges or credits on bills.
    c. *Parties Benefiting from Implementation*: Utilities and customers could benefit through greater certainty.
4. Related Existing Policies and Programs *(i.e., those that address similar issues without interacting*): Today, New Hampshire has utility-administered energy efficiency programs funded by customers through the System Benefits Charge (SBC) on electric bills and through a charge included in gas rates. Included in those programs, in addition to recovery of all prudently incurred costs, are monetary incentives of 8-12% of annual budgets paid to the utilities if performance goals are achieved in the implementation of the programs. However, under the current system, utilities in New Hampshire still have a financial incentive to maximize sales.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    a. *Existing*: See Item 4 above.
    b. *Proposed*:

i. The Public Utilities Commission (PUC) currently has an open docket to consider implementing rate mechanisms such as revenue decoupling for NH utilities. (Docket No. DE 07-064, opened May 14, 2007).

ii. EGU Action 1.2 – Energy Efficiency Procurement Energy Efficiency Procurement: In this policy, each electric and natural gas distribution company would be required to increase investments over a reasonable period of time in energy efficiency and demand reduction programs to capture all cost-effective investments (i.e., those available at lower cost than supply) that are reliable and feasible on behalf of all customers. The energy cost savings potential of this policy could be realized with the assistance of a rate structure that removes the throughput incentive for utilities to boost profits by selling more energy.

iii. SB451 (RSA 374-G): This legislation provides a framework to utilize ratepayer funds to make investments in distributed energy resources, including energy efficiency, by allowing a utility to include the costs of such investments in rates if the utility can show a benefit to all customers. At this time no utility has filed a proposal at the PUC to take advantage of this new law.

6. Timeframe for Implementation: A PUC docket is underway for decoupling and implementation could be as early as 2009. Should this fail, additional time would be needed for alternatives to be identified and dockets litigated.

7. Anticipated Timeframe of Outcome: See above.

Program Evaluation

In the context of the Climate Change Action Plan, alternative rate structures should be viewed as complementary mechanisms that enable utilities to support a variety of customer-side initiatives, including efficiency, demand response, and combined heat & power , all of which reduce energy consumption. The evaluation of these mechanisms should be based on whether they effectively achieve these objectives at reasonable administrative costs with minimal disruption to customers.

The energy savings and emission benefits of the alternative rate structures, considered by themselves and separate from any specific program incentives to increase energy efficiency, are not directly quantifiable. The magnitude of customer benefits will depend on the nature and investment levels of the specific programs adopted for reducing energy consumption and emissions.

1. Estimated CO_2 Emission Reductions: Emissions for this action are not separately quantified but are included as part of the analysis of RCI 1.1 – 1.3 as this would be a supporting Action.

2. Economic Effects

   a. Costs

      iv. Implementation Cost: Low
      v. Timing: Constant / even
      vi. Impacts: State government ***(due to administrative costs)***

   b. Savings: Not directly quantifiable; proposed action is a supporting mechanism.

3. Other Benefits/Impacts

a. *Environmental:* Improvements in energy efficiency will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.

b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.

c. *Social:* Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.

d. *Other:* Energy efficiency and emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles, and opportunities*)

   a. *Technical*: Alternative rate structures can be implemented relatively easily once the PUC determines appropriate policies.

   b. *Economic*: Alternative rate structures will have a positive impact on utilities and, if combined with incentives for energy efficiency, will promote economic activity in the energy efficiency industry and reduce consumers' energy costs over reasonable payback periods.

   c. *Statutory/Regulatory*: The PUC has the authority to approve alternative rate structures.

   d. *Social*: Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Other Factors of Note: Alternative rate structures may be combined with incentives for utilities to place greater emphasis on energy efficiency activities if the full benefits of new rate mechanisms are to be realized.

California has had revenue decoupling in place for most of the past 25 years. There, the decoupling mechanism is generally accepted as a way to make the state's electric utilities indifferent to sales levels. Decoupling has had only small impacts on rate volatility. Analyzing ten years' worth of decoupling data, a 1994 U.C. Berkeley study concluded that "decoupling has had a negligible effect on rate levels and has, for [one of the three utilities analyzed], actually reduced rate volatility."[9]

[9] Joseph Eto, Steven Soft, and Timothy Belden, *The Theory and Practice of Decoupling*, Lawrence Berkeley Laboratory, University of California, January 1994, Report LBL-34555, UC-350 at 46. The cited excerpt of this report is attached hereto as Ex. A. The full report has been filed electronically, and is on file with ENE and available upon request.

6. Level of Group Interest:

7. References:

- National Action Plan for Energy Efficiency (2007). Aligning Utility Incentives with Investment in Energy Efficiency. Prepared by Val R. Jensen, ICF International. www.epa.gov/eeactionplan
- Weston, Frederick (2008) Customer-Sited Resources and Utility Profits: Aligning Incentives with Public Policy Goals US EPA Webinar (28 August 2008) http://www.epa.gov/CHP/documents/wbnr082808_weston.pdf

EGU Action 1.3 – Increase the Use of Combined Heat & Power Resources

Revised November 17, 2008

Summary

The State should develop mechanisms to promote the use of combined heat & power (also known as CHP and cogeneration) systems for use as an on-site power plant or boiler to generate both electricity and useful heat simultaneously. This technology may be applicable where a thermal load (i.e., for space heating or industrial process heat) already exists or is planned. Combined heat & power would be appropriate for new boilers and for retrofits of existing boilers using cleaner-burning fuels that are not already co-generating electricity. For consistency with the goal of reducing overall emissions, any program designed around combined heat & power would need to define the allowable emission limits and might also specify allowable fuels for program eligibility. Mechanisms could include regulatory changes, incentives and portfolio standards.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
   Combined heat & power units enable more efficient electrical generation and the use of waste heat produced during generation and can be promoted through the implementation of incentives, policy and regulatory changes as needed. Clean combined heat & power systems give electricity consumers the capability of generating electricity or mechanical power on-site to meet all or part of their own needs, sell power back to the grid, and, through capture of heat typically lost during power generation, meet on-site thermal needs (hot water, steam, space heat, or process heat) or cooling (for example, through application of absorption chillers).

   Onsite generation of electricity reduces or eliminates electrical transmission needs, and any excess electricity produced by combined heat & power units can be delivered onto the grid. In so doing, combined heat and power raises the overall efficiency with which fuel is used in New Hampshire. Studies in many states have found cost-effective opportunities to reduce energy use by 20 percent or more. In addition to improvements in the efficiency of fuel use, and related reduction in greenhouse gas emissions, expanded use of distributed combined heat & power offers significant electricity system benefits (including avoided electricity transmission and distribution losses, and avoided requirements for electricity grid expansion).

   Enactment of incentives, policy and regulatory changes that promote the expansion of combined heat & power systems in New Hampshire would promote energy-saving opportunities instate and reduce dependence on other resources such as fossil fuels. Policies to encourage the adoption of combined heat & power include a combination of regulatory changes and possibly incentives for adoption of combined heat & power systems. The combination of regulatory changes and incentives would be designed to allow a certain percent of New Hampshire's estimated remaining combined heat & power potential to be realized at some in the future.

   Regulatory changes could affect interconnection standards, avoided-cost pricing rules and the existing net-metering regulations in New Hampshire, and in the latter case allow combined heat & power fired by non-renewable fuels to receive payments for the excess electricity fed back onto the grid. Incentives could take the form of investment incentives (e.g., tax credit, rebates) per kW or equivalent incentives per horsepower of capacity or production tax incentives per kWh or equivalent incentives per hp-hour.

Additional support would come in the form of the education and technical assistance required to support the integration of combined heat & power into siting and planning, building designs and operation by building planners, builders/contractors, energy managers and operators, and state and local officials. Support for research on combined power and cooling systems most relevant to New Hampshire could also occur, building on the work that has already begun at the University of New Hampshire with its landfill gas fired combined heat & power system.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order):* Supporting policies, regulation changes and incentives would need to be identified and then implemented.
    b. *Resources Required:* Monies from the RGGI Fund and possible the RPS fund for financial incentives. New education and technical assistance programs.
    c. *Barriers to Address:* Eligibility requirements/emission limits need to be defined so that the installed combined heat & power units achieve actual emission reductions.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: PUC, DES and the regulated electric and natural gas utilities.
    b. *Parties Paying for Implementation*: Ratepayers
    c. *Parties Benefiting from Implementation*: Utilities and all citizens.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Today, New Hampshire has utility-administered energy efficiency programs funded by ratepayers through the System Benefits Charge (SBC) on electric bills and through a charge included in gas rates.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    a. *Existing*:
        i. Renewable Portfolio Standard (RPS)
        ii. Regional Greenhouse Gas Initiative (RGGI).
    b. *Proposed*
        iv. Other policies proposed by the EGU working group and the RCI working group.
        v. SB451 (RSA 374-G) provides a framework for utility investments in distributed energy resources including energy efficiency.

6. Timeframe for Implementation: Enactment could be as early as 2009 with implementation in 2010.

7. Anticipated Timeframe of Outcome: 2010 – 2025.

Program Evaluation

1. Estimated CO_2 Emission Reductions
    a. Short-term (2012): Analysis not yet completed.
    b. Mid-term (2025):
    c. Long-term (2050):

2. Economic Effects
    a. Costs
        i. Implementation Cost: Moderately high
        ii. Timing: Low short-term / mostly long-term
        iii. Impacts: Evenly distributed
    b. Savings
        i. Potential Economic Benefits: High
        ii. Timing: Low short-term / mostly long-term
        iii. Impacts: Business – evenly distributed

3. Other Benefits/Impacts
    a. *Environmental*: Improvements in energy efficiency will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.
    b. *Health*: Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social*: Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other*: Energy efficiency and emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
    a. *Technical*: The technology exists to deploy combined heat & power systems immediately.
    b. *Economic*: Combined heat & power units will have a positive impact.
    c. *Statutory/Regulatory:*

d. *Social*: Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Other Factors of Note: Energy reductions resulting from combined heat & power should not be double-counted as reductions associated with implementation of RGGI.

6. Level of Group Interest:

7. References:

- U.S. Clean Heat & Power Association, http://www.uschpa.org/.
- American Council for an Energy-Efficient Economy, "Energy Efficiency and Resource Standards: Experience and Recommendations," http://www.aceee.org/pubs/e063.htm.
- NH Public Utilities Commission, Energy Policy Commission Interim Report 2007 (12/1/07), http://www.puc.state.nh.us/Electric/electric.htm.
- Connecticut Department of Public Utility Control, http://ct.gov/dpuc/.
- New England Power Pool (NEPOOL) Generation Information System, www.nepoolgis.com.

TLU Action 1.D.1 – Address Highway Travel Speeds

Revised November 17, 2008

Summary

The State of NH should explore mechanisms to reduce average travel speeds on state and interstate highways to improve overall vehicle fuel efficiency. This could occur through enforcement of existing speed limits and through driver education programs to encourage voluntary reductions. Evaluation of a lower speed limit should also be conducted.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result):*

   U.S. Department of Energy data show that fuel economy decreases rapidly at speeds above 60 mph: the average loss in fuel economy is 8.2 percent when speed is increased from 65 to 70 mph. At a posted speed of 65 mph, many vehicles travel at 65 to 75 mph; and a significant percentage of traffic moves at even higher, less efficient speeds. The publication "Reducing Traffic Speed" by the Technology Transfer Center New Hampshire LTAP at UNH states: "Police Enforcement lowers traffic speeds when police consistently issue tickets. However, cities and towns must commit personnel for a long time. When enforcement ends, drivers will return to the prior speeds." The result of diminished enforcement is that motorists on major highways drive in excess of 65 mph. Stricter speed enforcement would benefit those who already adhere to speed limits as well as those who prefer to exceed speed limits. The benefits would come in the form of fuel savings, emission reductions, and reduced incidence of highway injuries and fatalities.

2. Implementation Plan *(i.e., how to implement the specific policy or program):*

   a. *Method of Establishment (e.g., legislation, executive order):* Executive Order and/or legislation.

   b. *Resources Required:* Department of Transportation, Law Enforcement, funds for new speed limit signs.

   c. *Barriers to Address (especially for medium to low feasibility actions):* Politics associated with the change, enforcement costs.

3. Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):

   a. *Parties Responsible for Implementation:* State and local government.

   b. *Parties Paying for Implementation:* State and local government.

   c. *Parties Benefiting from Implementation:* Consumers – safer roads, and better gas mileage.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

   a. *Existing*:

   b. *Proposed:*

6. Timeframe for Implementation: 6 months to 1 year to pass legislation, proceed through public notice and outreach, and develop coordination/cooperation among law enforcement agencies. Changing speed limit signs could be done in about 2 weeks.

7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO_2 Emission Reduction:

Timeframe	CO_2 Emission Reductions (MMTCO2e per year)	
	Enforce Current Highway Speed Limits[10]	**Lower Posted Highway Speed Limits[11]**
Short-term (2012)	0.06	0.11
Mid-term (2025)	0.18	0.35
Long-term (2050)	0.25	0.48

2. Economic Effects:
   a. Costs:
      i. Implementation Cost: Low for both scenarios
      ii. Timing: Constant / even for both scenarios
      iii. Impacts: State government for both scenarios
   b. Savings:
      i. Potential Economic Benefit: Moderate and moderately high, respectively
      ii. Timing: Low short-term / mostly long-term for both scenarios
      iii. Impacts: Consumer – evenly distributed for both scenarios
3. Other Benefits/Impacts:
   a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
   b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. There will be other health benefits due to the reduction in car accidents brought about by safer highways.
   c. *Social*: It will impact drive times but consumers will save money & highways will be safer. In addition there will be a reduced dependence on foreign oil and the associated economic stability that may bring through reduced economic risks of the global energy market as well as increase in dollars kept instate.
   d. *Other*:

[10] Assumes that a reduction in *average* highway speed from 70 to 65 would result in an 8.2% increase in fuel efficiency applied to highway miles assumed to be 40% of the total Vehicle Miles Traveled (VMT) annually in New Hampshire.
[11] Assumes that a reduction in *average* highway speed from 70 to 55 would result in an 17.1% increase in fuel efficiency applied to highway miles assumed to be 40% of the total Vehicle Miles Traveled (VMT) annually in New Hampshire.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
    a. *Technical*: There are no technical barriers to implementation.
    b. *Economic*: Changing the speed limit signs is not expensive. No data are available on whether additional law enforcement officers would be needed to implement the program, but additional tickets could bring in necessary revenue.
    c. *Statutory/Regulatory*: This would require legislation.
    d. *Social*: It might be difficult to get the public to buy into reduced speed limits – this action could be perceived as infringing on personal freedoms.
5. Other Factors of Note: This could be combined with other programs such as allowing buses to travel at higher speeds which would help encourage commuters to use public transit. Emissions of nitrogen oxide, the primary pre-cursor pollutant to ground level ozone (smog) formation, also increase at speeds above 48 mph.
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO_2 emissions from the transportation and land use sector.
7. References:
    - http://www.t2.unh.edu/fall04/pg6.html
    - http://drive55.org/content/view/18/5/
    - http://www1.eere.energy.gov/vehiclesandfuels/facts/favorites/fcvt_fotw222.html

AFW Action 3.1 – Maximize Source Reduction and Recycling
Revised November 10, 2008

Summary

Commercial and residential source reduction and recycling programs should be expanded and promoted in municipalities through the development of a state operated revolving loan fund in order to address waste generation and disposal rates and reduce the greenhouse gas emissions associated with the life-cycle of products. This fund would be used to establish programs that cover the initial capital costs so that the substantial cost reductions can be realized over the short and long-term. While reducing municipal budgets, this fund would also enable significant greenhouse gas emissions reductions. A substantial portion of the solid waste stream is composed of materials that have significant embodied energy[12] content and that can be recycled or reused. The fraction of the waste stream that can be recycled or reused can displace the emissions associated with producing new materials from virgin raw materials.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
While New Hampshire's greenhouse gas inventory only considers the amount of greenhouse gas emissions that are released during the breakdown of materials in landfills, New Hampshire can facilitate the reduction in production related emissions in other states by significantly avoiding the generation of waste. The production-related emissions of materials are ~10 times higher than landfill emissions due to the energy associated with the mining, harvesting, processing and producing materials and products. A substantial portion of the solid waste stream is composed of materials that have significant embodied energy content and that can be recycled or reused. The fraction of the waste stream that can be recycled or reused can displace the emissions associated with producing new materials from virgin raw materials. The current recycling rate in New Hampshire is less than 21 percent, well below the national average of 32 percent. There are a number of potential strategies that can be applied to improve the state's recycling rate. For most households, the amount of waste that can't be reduced, reused, recycled, or composted is a minor portion of the original total waste volume.

There are a number of actions that can be taken to improve source reduction and recycling rates in New Hampshire. By developing a revolving loan fund that can enable these and other programs to be developed, through outreach, program development assistance and short-term loans to cover the initial capital costs, the State can help municipalities develop the incentives and programs that: reduce the amount of raw materials used; encourage the reuse and recycling of materials and products; and discourage single-use waste. The municipal source reduction and recycling programs could significantly reduce, and even potentially eliminate, the funds that municipalities need for waste disposal.

These programs could include:

- *Implement Resource Management Contracting*
  Resource management contracting relies on creating incentives such that the contracting waste hauler receives revenue from sorting and selling recyclable materials. This could include the cost transfer of tipping fees to the contracting waste hauler to provide a disincentive for the disposal of waste to a landfill or incinerator. This provides a financial incentive to the contracting waste hauler to maintain effective collection programs and to ensure appropriate sorting and recycling.

[12] Embodied energy refers to the energy that is required to extract, process, package, transport, install, and recycle or dispose of materials and products.

- *Developing Transfer/Recycling Center Collaborations*
  Establish central consolidation facilities that have both equipment and storage capacity and prepare materials for market and to preserve its value. This enables smaller municipalities to pool their resources and maintain cleaner material streams (e.g., sorted glass, aluminum, tin) with higher market values.

- *Implementing Pay-As-You Throw (PAYT) Programs*
  Under this program users pay to dispose of waste on a volume or weight basis which directly links user disposal cost to the amount of waste they generate. Traditional waste management costs are spread equally across all residents and low volume waste generators subsidize the higher volume generators disposal costs. The fee that is assessed for each bag or can of waste, or each pound of trash, provides an incentive for households to generate less waste, reuse what they can, compost certain organics, and recycle what remains. This type of program can lead to reduction in waste generation by 14 to 27% while increasing recycling by 32 to 59%.

- *Increasing the Salvage Reusable Building Materials*
  Salvage of reusable building materials, sometimes called "deconstruction," is growing in popularity. Some buildings slated for demolition contain valuable furnishings and fixtures, high-value wood flooring, molding and structural lumber, and other materials that can be reused, such as doors and sinks. The State could provide incentives, such as grants, to help establish an infrastructure of reusable building materials sites. Presumably, the incentives would primarily support capital and other start-up expenses, as revenue from the re-sale of materials should be sufficient to pay for ongoing operational costs. In addition to environmental and resource benefits, building material salvage provides more affordable materials to middle- and lower income households. Material salvage programs can also provide living-wage jobs.

- *Promotion of Commercial and Municipal Composting Operations*
  The State can encourage the establishment of municipally and commercially operated composting facilities capable of handling the yard and food waste that makes up more than 20 percent of the US waste stream. Leaf and yard waste is also easily composted, which allows us to treat the material as a resource rather than a waste. Composting of yard and food wastes can significantly reduce net GHG emissions, both by reducing methane emissions from landfills and by sequestering carbon in agricultural soils treated with finished compost. While leaf and yard waste compost operations do not require a permit, food waste composting operations, even when operated at high standards, can create odor problems. Due to this, commercial food waste composters may require major capital investments, such as mechanical aeration systems with biofilters or totally enclosed composting operations, in order to operate and require assistance getting started.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order):* Establishment of the revolving loan fund would require legislation and could be funded through a short term one cent fee on all bottles sold in the state. Solid waste management is handled at the local level and some programs would be established through local ordinances while others would require legislative action and State level implementation and coordination.

   b. *Resources Required:* Funding the revolving loan fund for additional staff that would be required to conduct outreach to municipalities and to assist in program development. Once

established, some programs would be self-funded (PAYT) through the monies generated by the program.

c. *Barriers to Address (especially for medium to low feasibility actions):* There may be resistance to a perceived tax, even if so small and to the apparent growth in State government, even if such growth will result in much larger savings to communities over the long-term.

Municipalities meet with resistance from some residents, who do not want to be "charged" for disposing of their trash. The residents need to understand that they are already paying for solid waste disposal in their property taxes (the statewide average is $242 annually), and there will be a savings in taxes that will offset the fee for the bags, unless they don't recycle or they have a very large family. Additionally, there is sometimes the concern that illegal dumping will occur, but this has not proved to be a significant problem in implementing towns.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)

   a. *Parties Responsible for Implementation*: Manufacturers, relevant trade associations, consumers associations, all state and local agencies, consumers, and retail outlets. The NHDES Waste Management Division would develop regulations, and provide guidance and conduct outreach as needed. Municipalities would need to pass ordinances to implement some programs and the legislature may be needed to establish others.

   b. *Parties Paying for Implementation*: Product purchasers and to a smaller degree tax payers.

   c. *Parties Benefiting from Implementation*: Tax-payers as New Hampshire communities with PAYT programs have reported average reductions in waste amounts ranging from 25 to 35 per cent. Municipalities and residents can expect a corresponding decrease in their solid waste disposal costs.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Solid waste is often the third or fourth highest line item in town budgets, so the cost savings are important.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)

   a. Existing: The New Hampshire Legislature has consistently endorsed recycling as a method to reserve the state's disposal capacity.

   b. Proposed:

6. Timeframe for Implementation: The fee to establish the revolving loan fund and required staff could be passed in the next legislative sessions. Municipalities would need to follow their own procedures for adopting ordinances.

7. Anticipated Timeframe of Outcome: The recycling rate will begin to increase as soon as the ordinances and programs become effective.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions – ANALYSIS UNDERWAY

   a. Short-term (2012):
   b. Mid-term (2025):

c. Long-term (2050):

2. Economic Effects

   a. Costs
      i. Implementation Costs: Moderately low
      ii. Timing: Immediate / higher initial costs
      iii. Impacts: Business – medium

   b. Savings
      i. Potential Economic Benefits: Moderate
      ii. Timing: Constant / even
      iii. Impacts: Evenly Distributed

3. Other Benefits/Impacts
   a. *Environmental*: Land filling solid waste results in leachate that must be treated prior to discharge and may result in the release of methane, a potent greenhouse gas, into the atmosphere. Similarly, there is concern about emissions from the incineration of solid waste.
   b. *Health*: It is not unusual for people living near landfills to complain about negative health effects from the odors. Leachate that escapes from a landfill can also impact surface and groundwater sources of drinking water.
   c. *Social*: There is significant resistance to new and expanded landfills and incinerators due to concerns about diminishing property values and health impacts. Potential programs may also institute equitable systems that require residents to pay for their own trash and not subsidize the cost of their neighbors who don't recycle or use more than their share of disposal services.
   d. *Economic*: There can be significant job growth from the recycling industry.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
   a. *Technical*: There are no technical barriers to implementation.
   b. *Economic*: Because PAYT has been shown to result in cost savings, there is significant economic benefit to implementation.
   c. *Statutory/Regulatory*: Legislation is required to establish the fee that will fund the additional staff and revolving loan fund.
   d. *Social*: The opposition to programs like PAYT is minor in comparison to concerns about property values, health impacts and odors and dumping has not been a significant problem.

5. Other Factors of Note:

6. Level of Group Interest: high

7. References:

Composting

- NHDES Fact Sheet, "Municipal Composting of Yard Waste" (2007)

http://des.nh.gov/organization/commissioner/pip/factsheets/sw/documents/sw-3.pdf

Pay-As-You-Throw

- NHDES brochure, "Pay As You Throw: A Community Solution For The Rising Costs Of Solid Waste Disposal."

Resource Management Contracting
- http://www.epa.gov/wastewise/wrr/rm.htm
- http://www.epa.gov/wastewise/pubs/rr_rm.pdf

RCI Action 4.6 - Develop an Overarching Education Plan
Revised November 14, 2008

Summary

The State of New Hampshire should implement a comprehensive climate change outreach & education program that increases current levels of awareness and knowledge in order to support action at all levels while simultaneously expanding the capacity of the state to develop and implement advanced mitigation and adaptation solutions in a phased-in approach in the future. Critical to this effort would be the marketing of the existing Climate Change Action Plan in order to foster the support necessary for wide-spread implementation.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result):*

   This comprehensive outreach & education program would be developed for the entire state in order to raise the awareness, knowledge and technological sophistication to the level necessary to support efforts by New Hampshire residents, businesses and institutions to prepare for the current and future impacts of climate change while mitigating the most severe changes. This program would coordinate the implementation of the outreach and education Actions already identified within the Climate Change Action Plan and identify, develop and implement any subsequent Actions that are deemed necessary to provide the public with the awareness and knowledge necessary to take immediate action while supporting research and innovation by academic institutions and for-profit entities that will devise the solutions necessary to achieve further greenhouse gas emission reductions and adapt to additional levels of climate change.

   This plan would require integration and coordination of existing and future efforts in order to disseminate the currently available information to the appropriate end-users, develop new opportunities and technologies most appropriate to New Hampshire, and distribute innovation when proven. The Plan would identify the opportunities and necessary implementation strategies to provide the background to all New Hampshire residents, from the members of the public, to students, to local officials, to business leaders to integrate climate change action into all levels of decision making while also targeting higher education and research to prepare the next generation of leaders and technology necessary.

   This Plan is the critical bridge to more aggressive climate change action, be it adaptation or mitigation, in the future.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
   a. *Method of Establishment (e.g., legislation, executive order):* This program would create partnerships between New Hampshire educators, energy efficiency, and environmental experts to identify and develop programs that target the knowledge and skills of New Hampshire residents related to climate change science, impacts and action. This could include materials and content

for all academic levels, training for trade groups and professional organizations along with ongoing support.

The long-term goal of this program would be to integrate climate change adaptation and mitigation into required training and certification programs in order to institutionalize climate change action in all sectors and all levels. Finally, development of degree programs and research support necessary to ensure that the next generation of climate change leaders and technologies are being created within the state.

b. *Resources Required*
   i. Partnership development would be required between state agencies, businesses and business groups, community-based organizations academic institutions, trade groups and professional societies, environmental organizations, and funding entities.
   ii. A comprehensive education plan would require funding for program development and implementation which would require staffing. Developing partnerships and building upon existing training programs could be an effective way to minimize costs. Potential grant funding may also be an option and to the extent that associate programming can be tied to direct reductions in energy, they may also be eligible for RGGI Fund monies.

c. *Barriers to Address (especially for medium to low feasibility actions):* This program would require significant effort to align multiple existing programs while developing new potential tracks which would require additional funds during a time of significant budget shortfall.

3. Parties Affected by Implementation *(i.e., residents, businesses, municipalities, etc.):*

   a. *Parties Responsible for Implementation:* New Hampshire Department of Environmental Services, the Office of Energy and Planning, the NH Department of Education, University System of New Hampshire including the Cooperative Extension, the Energy Efficiency and Sustainable Energy, municipalities.

   b. *Parties Paying for Implementation:* Grant making organizations, RGGI Fund and RPS Fund, Core Program fund.

   c. *Parties Benefiting from Implementation:* All NH residents, current and future.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

   The New Hampshire Sustainable Energy Association (http://www.nhsea.org), Residential Energy Performance Association (http://www.repa-nh.org), and the American Council for an Energy Efficient Economy (http://www.aceee.org/), among others, include information resources regarding energy efficiency on their websites.

   The New Hampshire Sustainable Energy Association's Consumer Guide (http://www.nhsea.org/resources.php) is an excellent resource for locating companies and organizations that offer sustainable energy products and services in New Hampshire.

   Google.org is a potential resource for finding examples of existing broad-scope websites on energy efficiency and sustainable energy products and technologies.

5. Complementary Policies *(i.e., those that achieve greater reductions through parallel implementation):*

a. *Existing*

b. *Proposed:*
- RCI Action 4.1 - Include Energy Efficiency and Conservation in School Curriculum;
- RCI Action 4.2 - Increase Energy Efficiency through Building Management Education Programs;
- RCI Action 4.3 - Reduce Residential Energy Demand through Education and Outreach
- RCI Action 4.4 – Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program
- RCI Action 4.5 – Create an Energy Efficiency and Sustainable Energy Systems Web Portal

6. Timeframe for Implementation: 2008 and ongoing

7. Anticipated Timeframe of Outcome: 2008 and ongoing

Program Evaluation

1. Estimated CO_2 Emission Reduction:
   a. Short-term (2012)
   b. Mid-term (2025)
   c. Long-term (2050)

2. Economic Effects:
   a. Costs:
      i. Implementation Cost:
      ii. Timing:
      iii. Impacts:
   b. Savings:
      i. Potential Economic Benefit:
      ii. Timing:
      iii. Impacts:

3. Other Benefits/Impacts:
   a. *Environmental:* In the longer term, this would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
   b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
   c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term

payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.

a. *Other*: Secondary benefits include behavioral changes that improve environmental conditions in numerous areas (e.g., solid and hazardous waste reduction, reduced sprawl), inspiration of future generation in development of alternative energy sources and technologies, preparation of future generation for participation and leadership in a wide variety of green businesses, and increased awareness in environmental impacts on health.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
    a. Technical: This is technically feasible and would require program development in order to implement.
    b. Economic: This would be associated with an upfront cost but as an investment would have a net economic benefit over the long term through avoided costs as well as the economic development associated with innovation and technological advancement.
    c. Statutory/Regulatory:
    d. Social: There may be some resistance to additional programs that do not have an immediate direct benefit. The early emphasis on marketing the full Climate Change Action Plan and the need for early action to mitigate and adapt to climate change may be essential to address this issue.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

RCI Action 1.8 – Conserve Embodied Energy in Existing Building Stock

Revised September 8, 2008

Summary

State-wide policies and programs should be developed that recognize, quantify, and encourage the conservation of the energy embodied in the New Hampshire's older building stock. This action would reduce future energy consumption and emissions both directly through energy conservation and indirectly through the preservation of the embodied energy in existing buildings. If these potential energy savings and reduction in carbon emissions are to be realized, the proposed action will require research, education, and incentive programs that incorporate conservation of embodied energy as well as life-cycle assessment of buildings, components and materials.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result):*

   The action would preserve the embodied energy of the existing building stock. "Embodied energy is the total expenditure of energy involved in the creation of the building and its constituent materials," and the energy invested in it throughout its use.[13] Embodied energy is a key component of life-cycle analysis, which examines the environmental impact of building materials and systems from raw material, through use within a building, to demolition and disposal. Under this concept, energy is conserved within the existing building, it is not expended in demolition or new construction, and new materials needs are minimal, even in an efficiency-increasing project.

   Research and educational programming are first needed to implement this action. The methodology requires calculations to be made, appropriate to New Hampshire conditions and building stock, that take into account life-cycle analysis and embodied energy when energy audits are performed or when rehabilitation projects are planned. Existing research and calculations will make this process easier, requiring only study to determine which models are most appropriate for New Hampshire. The final product would be New Hampshire-specific testing tools and an energy rating system, possibly to be used for the energy audits recommended as a baseline calculation in HB 1434 (2008).

   Education programs are needed to widely introduce the concept of embodied energy, which is unknown to most people – even professionals in the building and construction industries. Professionals, building owners and managers, and homeowners would be the target of this education, accomplished through a variety of public outlets and public-private partnerships. A list of best practices and demonstration projects that increase the energy efficiency of historic and older structures while preserving embodied energy would be developed and widely distributed.

   Greater reductions could be achieved through incentives developed at the state and local levels. Incentives may already exist, or may be proposed in other action items; these could be adapted to promote good use of embodied energy and encourage life-cycle analysis of systems and materials proposed in building upgrades. Further reductions could be achieved with the implementation of state or local regulations that mandate building conservation (not incorporated into this action item).

2. Implementation Plan *(i.e., how to implement the specific policy or program):*

[13] Donovan Rypkema, "Economics, Sustainability, and Historic Preservation," keynote address at the National Trust Conference, Portland, Oregon, 1 October 2005.

a. *Method of Establishment (e.g., legislation, executive order):* The proposed action could be implemented at the direction of a commission comprised of architectural, preservation, and building professionals to research and develop calculations and educational programming. Other participants would include a council of existing state and local agencies, including the municipal energy committees proposed by HB 1434, and appropriate private industry partners to formulate educational opportunities and incentives programs.

b. *Resources Required:* Existing research and previous initiatives within state government (1970s energy policy, 2000 smart growth initiative, as well as others) will provide the information necessary to craft the calculations systems. The formation of a board to helm this initiative would keep it on track; the programs can then be implemented as part a variety of existing programs.

c. *Barriers to Address (especially for medium to low feasibility actions):* Misinformation and a lack of knowledge concerning the importance of embodied energy will require outreach to and education for officials, professionals, and property owners. Market barriers and mistaken assumptions, such as the idea that new materials, such as PVC, are more energy-efficient than traditional wood, need to be addressed.

3. Parties Affected by Implementation *(i.e., residents, businesses, municipalities, etc.):*

   a. *Parties Responsible for Implementation:* Legislature, Governor's Office, Executive Council, state agencies, municipal government, educational organizations.

   b. *Parties Paying for Implementation:* Implementation would build on existing programs. The state, educational institutions or private industry would fund the development of research and education programs.

   c. *Parties Benefiting from Implementation:* Property owners would benefit from the enhancement of their properties, better access to energy efficiency programs, and reduced energy costs. Towns would benefit from the reduction in construction waste and decreased stress on infrastructure.

4. Related Existing Policies and Programs: LEED certification, Smart Growth initiatives, code flexibility for historic buildings, energy conservation education through OEP and local utilities.

5. Complementary Policies *(i.e., those that achieve greater reductions through parallel implementation):*

   a. *Existing*: RSA 266-1, RSA 21-I-9, International Existing Building Code (existing, but not adopted in New Hampshire), House Bill 1434, 2008, state fire code, NFPA 909 and NFPA 914.

   b. *Proposed*:
   LEED 3.0/2010
   RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
   RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
   RCI Action 1.4A – Upgrade Building Energy Codes
   RCI Action 1.4B – Improve Building Energy Code Compliance
   RCI Action 1.7 – Preserve Older Buildings and Neighborhoods as Components of Sustainable Communities
   RCI Action 4.1 – Include Energy Efficiency and Conservation in School Curriculum

RCI Action 4.2 – Increase Energy Efficiency through Building Management Education Programs
RCI Action 4.3 – Reduce Residential Energy Demand through Education and Outreach
RCI Action 4.4 – Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program

6. Timeframe for Implementation: Study commission created as soon as feasible. Education programs to be developed contiguously.

7. Anticipated Timeframe of Outcome: Each phase to be implemented as information develops.

Program Evaluation

1. Estimated CO_2 Emission Reductions: This action not individually quantified.
2. Economic Effects

    a. Costs:

        i. Implementation Cost: Moderately high
        ii. Timing: Constant / even
        iii. Impacts:

    b. Savings:

        i. Potential Economic Benefit: High
        ii. Timing: Constant / even
        iii. Impacts:

3. Other Benefits/Impacts:

    a. *Environmental*: "The continued use of our existing buildings reduces the amount of demolition and construction waste deposited in landfills, lessens unnecessary demand for energy and other natural resources, and conserves embodied energy."[14] Also, most older buildings are constructed of renewable, sustainable, natural materials requiring a minimum of manufacturing energy to create and maintain.

    b. *Health*: Sustainable historic materials and traditional construction promote a healthy indoor environment through the use of natural ventilation, natural light, and minimally manufactured materials that do not emit toxic gases at the beginning of their life cycles.

    c. *Social*: "[P]reservation of existing neighborhoods and commercial districts embodies the concept of a sustainable society. Preserving and continuing to use existing neighborhoods with their closely integrated network of houses, schools, parks, open spaces, streets, alleys, and religious institutions provides residents with an environment that encourages human interaction."[15]

[14] National Trust for Historic Preservation, "Sustainability Fact Sheet," quoting an US Energy Information Agency study. Accessed 7 May 2007 at http://www.preservationnation.org/issues/sustainability/additional-resources/the-facts-about-preservation-a.html.
[15] Call for Papers: 6th National Forum on Historic Preservation Practice, A Critical Examination of Preservation and Sustainability, October 2007.

d. *Other*: "The long-term erosion in the inventory of old homes is basically irreversible. Demolitions and disaster losses are the current major reason old residential units fall out of the inventory, and there is no recovery from these processes. The number of old units is likely to continue to dwindle through decay and through outright elimination in order to reuse the property. However, these old houses have already weathered numerous storms in their lifetime, and many have the utility, substance, and unique character to continue as housing for many more years."[16]

4. Potential for Implementation *(i.e., including challenges, obstacles and opportunities):*

   a. *Technical*: There is already sufficient theoretical knowledge to deal analytically and technically with the adaptation of older buildings for enhanced social benefit while preserving their embodied energy and thereby reducing potential CO_2 release.

   b. *Economic*: Funding may be required in order to induce developers to undertake such projects, thereby instilling confidence and illustrating the feasibility of rehabilitating upper floors and other underutilized portions of older buildings.

   c. *Statutory/Regulatory*: Further legislation may be required to enable communities to adopt appropriate criteria for the continued use or reuse of older commercial and industrial buildings, and to ensure that matters of life safety, fire protection, structural integrity, handicapped accessibility, energy conservation, traffic, parking, and other health and safety considerations for such buildings are satisfied in a responsible but flexible manner.

   d. *Social*: Social factors affecting the potential for implementation may include changing attitudes toward mixed building uses, residential occupancy of upper stories, reliance on public transportation as distinct from the automobile, and increased population density in village or urban districts. Current demographic studies indicate that Americans are willingly returning to cities and are readopting urban modes of living. These trends suggest that there will be a positive social response to the principles of this policy, thereby ensuring the realization of the environmental benefits that underlie the policy.

5. Other Factors of Note:

   "The Northeast had the smallest supply of housing in 2001 – 18.8% of the nation's total…The Northeast was home to 43.4% of the nation's stock of about 10 million old homes [defined as any house built before 1920]…, reflect[ing] its earlier period of settlement."[17]

   The federal census reports that approximately 140,000 of the estimated 660,000 total housing units in the state were built before1940.[18] Buildings constructed prior to 1920 have shown, in recent studies, to be more energy efficient than those built at any time in the rest of the century.[19] The majority of these buildings were constructed using sustainable, often local, and repairable materials, were site-

[16] Barbara T. Williams, "These Old Houses: 2001," Current Housing Reports, US Census Bureau, February 2004, 22.

[17] Barbara T. Williams, "These Old Houses: 2001," Current Housing Reports, US Census Bureau, February 2004, 3.

[18] According to the NH Office of Energy and Planning website, accessed 6 June 2008, 32.3% of net energy overall is used to heat buildings and structures, and another 36.6% is used to generate electricity. Net energy use by the residential sector is 14.7% of the total NH energy use.

[19] Energy Information Administration, "2003 Buildings Energy Consumption Survey: Building Characteristics Tables." Revised June 2006, Table B24, 150.

oriented for maximum energy efficiency, and incorporate passive energy-conserving design features (natural lighting, cross-ventilation, etc.). Best practices for the maintenance of these older buildings, including energy efficient improvements, call for repairing existing building fabric or replacing in-kind with traditional building materials, which tend to be renewable and require minimal manufacturing. This results in a smaller carbon footprint for the project than would full replacement with new materials. Research, education, and incentives will increase the number of these types of projects in New Hampshire.

6. Level of Group Interest: Medium

7. References:

TLU Action 2.B.1.c – Expand and Improve Bicycle and Pedestrian Infrastructure

Revised September 8, 2008

Summary

Improve and expand bicycle and pedestrian infrastructure to increase the viability of these travel modes as options for shorter-distance local trips, particularly within existing community centers, around transit-access points, and in other areas of higher-density, compact, mixed-use development.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Example policy actions to implement/continue:
    - Expand existing bicycle routes program with NHDOT with an emphasis on local and intra-regional networks.
    - Implement "complete streets" roadway improvement standards (at local and state levels).
    - Continue implementation of the Context Sensitive Solutions (CSS) project development approach by NHDOT.
    - Encourage adoption of higher-density, mixed-use zoning in pedestrian-oriented areas and apply pedestrian-oriented design standards for new residential and commercial development (see actions under TLU Goal 2.C).
    - Continue/expand "Safe Routes to School" program by NHDOT.

    Improving the availability of biking and walking as a viable travel option would help reduce single-occupancy vehicle use and total vehicle miles traveled, particularly for short-distance, local trips within compact areas and around transit-access points.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
    a. *Method of Establishment (e.g., legislation, executive order):* NHDOT could expand its existing bike-ped program, along with implementing "complete streets" approaches that ensure that all modes of travel are accommodated and supported. Assistance and grant funding could be coordinated by the Metropolitan Planning Organizations (MPOs) or Regional Planning Commissions (RPCs), together with NHDOT. Legislative action is likely required to provide for increased funding and technical assistance to identify and implement appropriate actions.
    b. *Resources Required*
        - MPO (or RPC) and NHDOT staff time (will require additional staff to coordinate assistance program).
        - Funding (local/state match for Federal $) for studies required to identify appropriate improvements.
        - Initial and on-going capital improvements.
    c. *Barriers to Address (especially for medium to low feasibility actions):*
    Acceptance of bicycle and pedestrian facilities (in some places). Could involve increased costs for projects.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.):

    a. *Parties Responsible for Implementation:* Local municipalities, with coordination by MPOs/RPCs and/or NHDOT.

    b. *Parties Paying for Implementation:* Local municipalities. Significant investments in multiple areas across the state will likely require additional support (financial and technical) from state government.

    c. *Parties Benefiting from Implementation:* NH population as a whole benefits from reduced vehicle travel and air pollution. Can help strengthen communities – increasing economic activity and community vitality.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

    a. *Existing:* NHDOT planning/project emphasis on Context Sensitive Solutions, *complete streets*, and existing bicycle/pedestrian program, NHDOT funding programs (e.g., TE, CMAQ).

    b. *Proposed*

    - Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
    - Expansion and enhancement of local bus services.
    - Zoning to provide compact, mixed-use, walkable development (including affordable housing) (see 2.C. Actions)
    - Policies that increase the cost of using a vehicle for travel:
      TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
      TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure
      TLU Action 2.A.4 – Implement VMT-Based Registration Fees
      TLU Action 2.A.5 – Increase the State Gasoline Tax
      TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
      TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking

6. Timeframe for Implementation: On-going beginning in 2010-2012 as state/local funding becomes available (could possibly be matched to federal funding) with an initial focus on increasing facilities in higher-population areas (i.e., community centers within southern NH) and where roadway/streetscape improvements are planned.

7. Anticipated Timeframe of Outcome: Reductions in VMT would begin to be realized as soon as bike/ped facilities are improved.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions:

a. Short-term (2012): 0.02 MMTCO2e/year
b. Medium-term (2025): 0.08 MMTCO2e/year
c. Long-term (2050): 0.11 MMTCO2e/year

2. Economic Effects:

   a. Costs:

      i. Implementation Cost: Moderately low
      ii. Timing: Constant / even
      iii. Impacts: Consumer – evenly distributed

   b. Savings:

      i. Potential Economic Benefit: Supporting Mechanism
      ii. Timing:
      iii. Impacts:

3. Other Benefits/Impacts:

   a. *Environmental*: Reduced air emissions from SOV travel and congestion. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.

   b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. May also increase the use of more active travel modes (walk/bike) for part of trip, improving health of individuals.

   c. *Social:* Improved communities – increased economic activity and community vitality

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

   a. *Technical*: High / Moderate.

   b. *Economic*: Moderate. Funding constraints are significant – likely will require identification and implementation of new funding mechanisms. Local municipalities are authorized (HB 648, 1998 – get RSA citation) to collect an additional motor vehicle registration fee of up to $5.00 for the purposes of supporting a municipal transportation improvement fund to support a wide-variety of transportation system improvements, including bike/ped improvements (few communities currently are taking advantage of this authority).

   c. *Statutory/Regulatory*: High / Moderate. Policy already has moved this direction. However, could be difficult to obtain funding. Could require legislative support (at state level) and local community support (e.g., town meeting vote) to secure required funding.

   d. *Social*: High / Moderate. There is growing support for providing a balanced, multi-modal transportation system, but support for local funding could be difficult to obtain.

5. Other Factors of Note: N/A

6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (i.e., supports other actions and/or achieves moderate reductions but not considered "essential" to achieve substantial CO2 reductions from the transportation and land use sector)

7. References:

- ***NHDOT*. NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire*, Public Draft. May 1, 2008.***
- ***Federal Highway Administration.* Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program, SAFETEA-LU Section 1807, *http://www.fhwa.dot.gov/environment/bikeped/ntpp/index.htm*.**

TLU Actions 2.B.2.a – Maintain and Expand Passenger Rail Service

Revised September 8, 2008

Summary

Maintain and expand passenger rail service within New Hampshire as part of a balanced, state-wide, multi-modal transportation system that keeps the state competitive with and accessible to the region. Initial actions would focus on sustaining and improving existing passenger rail service. Near- to mid-term actions would focus on improving and expanding New Hampshire's primary travel corridors (I-93 from Salem through Manchester to Concord, and the full traverse of I-95 on the Seacoast). Long-term actions would address the goal of expanding passenger rail service throughout New Hampshire.

Program Description

1. Mechanism (i.*e., how the policy or program achieves the desired result*): New Hampshire would undertake measures to support and extend passenger rail service within the state as part of a balanced, multi-modal transportation system. The following timeline and actions are proposed:
    a. Immediate initiatives: Sustain and improve existing passenger rail service and plan for future service, as follows:
        - Provide dedicated, long-term financial support;
        - Make strategic improvements to service, e.g., improve intermodal facilities and make track upgrades to support higher speeds;
        - Protect active/inactive rail corridors; and
        - Expand rail service planning (consider a 10-year rail investment plan).
    b. Near-term actions:
        - Implement new services now under study, e.g., extensions from Massachusetts to Nashua and Manchester, and from Newburyport to Kittery; and
        - Because Canada is New Hampshire's major trading partner, improve/restore lost rail connections to support both freight and passenger service to Canada.
    c. Future actions:
        - Review the historic rail system for possible applicability to future rail service, and
        - Study and implement additional extensions and restorations of service with the goal of establishing a state-wide passenger rail system.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
    a. *Method of Establishment (e.g., legislation, executive order):* Continue and extend role of NHDOT and newly-formed NH Rail Authority. Involve other interested parties such as state agencies, business development and social service organizations. A fully developed multi-modal system would require legislation, the revision of zoning ordinances, education and changes in spending and policy at federal, state and local levels.
    b. *Resources Required:* Substantial funding required for studies, capital improvements, land acquisition, and operating expenses.
    c. *Barriers to Address (especially for medium to low feasibility actions):*

- Requires significant (and continued) public expenditure
- Need for improved understanding regarding how individual modes interact and extent of benefits available from a complete multi-modal system.
- Restoration of the connectivity that existed in the historic rail system, which once had 24 points of rail access to neighboring states and Canada. In the Southern tier only the Downeaster corridor exists. (For instance there is not a direct rail connection with Canada our major trading partner.) All others have been temporarily lost but could in certain cases be restored by using those abandoned corridors preserved in the NH DOT railbanking program.
- Local zoning typically does not envision the restoration of a rail transportation system and does not allow for transit-oriented development.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.):
    a. *Parties Responsible for Implementation:* The parties involved include a collaboration of planning agencies, federal, state and local government, the business community, media organizations and advocacy organizations and the general public
    b. *Parties Paying for Implementation:* Various government entities, the general public and the business community.
    c. *Parties Benefiting from Implementation:* The general public, the business community (particularly those that can redirect long-distance shipping from truck to rail), economic development entities, social service agencies, the tourism industry, as well as municipalities.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
    a. *Existing:*
        - NH has railbanked many miles of old rail corridors that parallel all of our main highways.
        - Downeaster service through NH – needs to be sustained.
        - Increased Federal funding for rail system improvements
    b. *Proposed.*
        - Expansion and improvement of other modes of public transportation (i.e., bus service) as well as complementary facilities (e.g., intermodal facilities) – see actions under category 2B.
        - Complementary land uses emphasizing higher-density, mixed-use, walkable development (including affordable housing) in the vicinity of rail stations (see actions under category 2C, particularly 2.C.2).
6. Timeframe for Implementation: Immediate actions can be taken to sustain and improve existing service. Service extensions now under study can/should be implemented within 10-20 years. State-wide passenger service will take 20-30 years to restore.

7. Anticipated Timeframe of Outcome: The benefits of a transportation system with passenger rail would occur in anticipation of the first train (as land development is influenced). Benefits would increase over time as travel behavior and land use adjust.

Program Evaluation

1. Estimated CO_2 Emission Reductions:
    a. Short-term (2012): 0.00 MMTCO2e/year
    b. Medium-term (2025): 0.05 MMTCO2e/year
    c. Long-term (2050): 0.15 MMTCO2e/year

2. Economic Effects:
    a. Costs:
        i. Implementation Cost: Moderate
        ii. Timing: Constant / even
        iii. Impacts: Evenly distributed
    b. Savings:
        i. Potential Economic Benefit: Very high
        ii. Timing: Constant / even
        iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:
    a. *Environmental*: Better use of land if encourage compact, transit-oriented development near stations, as well as enhanced air quality due to reduced emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
    b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Also, avoids tension from driving and encourages walking through transit-oriented development around rail stations.
    c. *Social*: Public transportation options can provide additional travel opportunities for citizens and increase community vitality by increasing opportunities for human interaction on a daily basis. Provide transportation options for the elderly and handicapped.

        See Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook.* January 2008. Victoria Transport Policy Institute. Table 3.1 provides a listing of potential social costs and benefits associated with transit investments, including (among others) mobility and travel efficiency improvements, health benefits, and economic development gains. This report also has a good discussion comparing the benefits of bus and rail service.
    d. *Other*: Improves the marketability of property near rail stations and corridors. Freight rail allows for choice in the shipment of goods thus allowing for more opportunity to obtain

competitive prices for shipping materials. Provides a choice in transportation modes between car, bus and rail.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): With the establishment of the transit authority and the passage of a rail liability bill, passenger rail is finally being acknowledged as an alternative mode of transportation. However, in addition to the issue of funding there is the challenge of the reduced size of the rail infrastructure.

    a. *Technical*: An evaluation is being conducted to extend rail service beyond Lowell to Nashua and Manchester. The Rt. 93 transit study is expected to recommend rail as a transit enhancement. The Rockingham Planning Commission has evaluated an extension of rail service beyond Newburyport to Kittery. Phase one of a study to evaluate Boston-Montreal high speed rail service.

    b. *Economic*: Two reports commissioned by the city of Manchester confirm that transit would be a key to it economic well being. The Northern New England Passenger Rail Authority (NNEPRA) operators of the Downeaster, have released a study that confirms the positive effect of rail on economic development (4). Nashua Regional Planning Commission has commissioned a similar study with the same results.(1)

    c. *Statutory/Regulatory:* Excellent as NH has created a transit authority to develop and operate rail. Governor Lynch ha signed into law a passenger rail liability cap bill. Limited funding for public transportation is still a significant barrier that needs to be addressed.

    d. *Social*: There is growing public support for the restoration of rail service in New Hampshire, although this can be tempered by concerns regarding specific alignments. Rail as exemplified by the Downeaster has served to recondition the public perception on rail from a vestige of nostalgia to one that is part of the fabric of daily life.

5. Other Factors of Note: The renewed interest in rail is relatively recent in NH but not to the region or the country where billions are being invested in the creation and expansion of rail corridors for freight and passenger needs as well as the reintroduction of ferry service.

6. Level of Group Interest: High. The working group considered this an essential action that required initial action in the near-term and continuing effort over the mid- and long-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- Nashua Regional Planning Commission, www.nashuarpc.org.
- New Hampshire DOT I93 investment study, http:www.i93transit.org.
- Commuter Rail service to Costal NH, A feasibility study for the Hampton Branch, email @rpc-nh.org.
- Manchester Reports available through the City of Manchester Planning Department, Downeaster study available through Northern New England Rail Passenger Authority (NNEPRA
- http://www.transport2000.ca/atlantic/railvsroad.html.
- NHDOT, NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire, Public Draft, May 1, 2008.

- NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008